ABSTRACT

A method for selecting maximum and minimum catalyst particle sizes for use in a multiphase reactor that reflects optimum operating conditions of the reactor is based on a maximum Archimedes number for estimating the maximum particle size and a property of a separation system linked to the reactor to determine the minimum particle size. The maximum Archimedes number could be selected based on a maximum catalyst non-uniformity in the reactor. Additionally, a method for producing hydrocarbons from syngas in a slurry bubble column reactor comprises the use of a plurality of fresh catalyst particles with an optimum size distribution based on a range of Archimedes numbers between about 0.02 and 250 or alternatively based on an average Reynolds number less than about 0.1.